

Prepared by:



ASHEVILLE STEAM ELECTRIC GENERATING PLANT

1982 ASH BASIN

1964 ASH BASIN

CLOSURE PLAN

OCTOBER 10, 2016

Certified by:



Amec Foster Wheeler Environment & Infrastructure, Inc.

2030 Falling Waters Road, Suite 300

Knoxville, TN 37922

North Carolina License Number: F-1253

ASH_CLOSE_PLN

Rev. 0

Duke Energy Progress, LLC (Duke Energy) prepared this Closure Plan for the Coal Combustion Residuals (CCR) surface impoundments at the Asheville Steam Electric Generating Plant (Asheville) pursuant to the requirements of 40 C.F.R. § 257.102(b) of the Disposal of CCR from Electric Utilities rule, 80 Fed. Reg. 21302 (April 17, 2015). Amec Foster Wheeler was retained by Duke Energy to certify that this Closure Plan meets the requirements of 40 C.F.R. § 257.102. The information contained in this Closure Plan will be used to assist Duke Energy in the closure of the 1964 Ash Basin and 1982 Ash Basin (collectively, Ash Basins) located in Buncombe County, North Carolina, on property owned by Duke Energy. This Closure Plan may be amended pursuant to the requirements of 40 C.F.R. § 257.102(b)(3). Presented below are:

1. A narrative of closure activities;
2. A description of the procedures to remove CCR and decontaminate the CCR units;
3. An estimate of the in-place CCR inventory requiring closure;
4. An estimate of the largest area of the CCR units requiring a final cover (as needed);
5. A closure schedule; and
6. A written certification from a qualified professional engineer, licensed in North Carolina, that this Closure Plan meets the requirements of 40 C.F.R. § 257.102.

1 NARRATIVE OF CLOSURE ACTIVITIES

The purpose of this Closure Plan is to describe the steps required to close the Ash Basins at Asheville consistent with recognized and generally accepted good engineering practices. Closure is designed to reduce the need for long-term maintenance and control the post-closure release of constituents into environmental pathways (i.e., air, surface water, and groundwater).

The Ash Basins will be closed through the removal of CCR, and the closure will be performed pursuant to 40 C.F.R. § 257.102(c). CCR will be removed as described in the following section.

2 CCR REMOVAL AND DECONTAMINATION

The procedures to remove CCR from the Ash Basins include dewatering and utilizing appropriate equipment and methods to excavate and move the CCR to an off-site permitted landfill. Dewatering will include removal of bulk water/free liquids and interstitial/pore water (as needed) to allow for safe excavation.

The existing embankments will be breached pursuant to a North Carolina Department of Environmental Quality (NCDEQ) Dam Safety permit approval. The embankments will be re-graded so that the closure area will be filled to promote free drainage of stormwater from the closure area.

Existing appurtenant structures, such as ditches, culverts, and miscellaneous piping, will be decontaminated and abandoned in place, removed and disposed in a permitted disposal facility, or removed and placed in a beneficial use facility identified at the time of closure.

Decontamination procedures may consist of pressure washing, scrubbing, or other generally accepted decontamination procedures.

Pursuant to 40 C.F.R. § 257.102(c), closure will be complete when groundwater monitoring concentrations do not exceed the applicable groundwater protection standard established pursuant to 40 C.F.R. § 257.95(h) for constituents listed in appendix IV to 40 C.F.R. Part 257.

3 ESTIMATE OF IN-PLACE CCR INVENTORY

The volumes of CCR present in the Ash Basins were calculated and are presented in Table 1 below, pursuant to 40 C.F.R. § 257.102(b)(1)(iv). The volumes are the estimated inventory of CCR that will be open (and require closure) at one time, and the estimates are based on bathymetric surveys, historical topography, and soil borings as of December 2015. The annual surface impoundment inspections completed, pursuant to 40 C.F.R. § 257.83(b), and posted to the Duke Energy CCR website, pursuant to 40 C.F.R. § 257.107(g)(5), contain the most recent estimates of CCR material in the Ash Basins.

Table 1. Estimated In-Place CCR Inventory

Basin	Quantity of CCR (cubic yards)
1964 Ash Basin	2,113,000
1982 Ash Basin	686,000
Estimated Total	2,799,000

4 ESTIMATE OF LARGEST AREA REQUIRING FINAL COVER

CCR will be removed from the Ash Basins pursuant to 40 C.F.R. § 257.102(c). Therefore, no final cover system will be needed in support of closure activities.

5 CLOSURE SCHEDULE

Closure of the 1964 Ash Basin will be initiated pursuant to 40 C.F.R. § 257.102(e) and is anticipated to be completed within five years of the commencement of closure pursuant to 40 C.F.R. § 257.102(f)(1)(ii). Closure of the 1982 Ash Basin was initiated in 2015 pursuant to 40 C.F.R. § 257.102(e) and is anticipated to be completed within five years of the commencement of closure pursuant to 40 C.F.R. § 257.102(f)(1)(ii). Closure of the 1982 Ash Basin is anticipated to be completed by 2017, and the 1964 Ash Basin is anticipated to be completed by 2022.

Prior to commencing closure construction, design documents will be prepared to support applications for required local, state, and federal permits. Closure construction design documents will include construction drawings, technical specifications, and quality assurance testing work plans. The permits required for closure construction activities will be evaluated at the time of closure and are anticipated to include permits from NCDEQ and the U.S. Army Corps of Engineers. Preliminary time frames of anticipated closure activities are included below

in Table 2. We estimate that all of the closure activities for the Ash Basins will be completed by 2022.

Table 2. Estimated Time Frames for Closure Activities

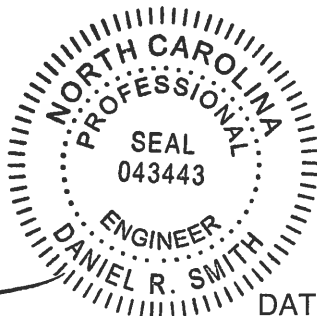
Closure Activity	Time Frame (years)*	
	1964 Ash Basin	1982 Ash Basin
NCDEQ Closure Plan Approval	1	-
NCDEQ Permitting Approvals (NPDES, E&SC, Air)	1	-
Dewatering and Stabilization	5	-
CCR Excavation	5	0.5
NCDEQ Dam Breach Approval	0.5	0.5

*Estimated closure activity time frames may include some overlap.

6 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Daniel R. Smith, being a registered Professional Engineer in the state of North Carolina, do hereby certify to the best of my knowledge, information, and belief, that the information contained in this written Closure Plan dated October 10, 2016, was developed pursuant to the requirements of 40 C.F.R. § 257.102 and has been prepared in accordance with recognized and generally accepted good engineering practices.

SIGNATURE

DATE

10/10/16

Prepared by:



H.F. LEE ENERGY COMPLEX
ACTIVE ASH BASIN

CLOSURE PLAN

OCTOBER 10, 2016

Certified by:



Geosyntec Consultants of NC, PC
1300 South Mint Street, Suite 300
Charlotte, North Carolina 28203
License No. C-3500

HFLEE_CLOSE_PLN

Rev. 0

Duke Energy Progress, LLC (Duke Energy) prepared this Closure Plan for the Coal Combustion Residuals (CCR) surface impoundment at the H.F. Lee Energy Complex (H.F. Lee) pursuant to the requirements of 40 C.F.R. § 257.102(b) of the Disposal of CCR from Electric Utilities rule, 80 Fed. Reg. 21302 (April 17, 2015). Geosyntec Consultants of North Carolina, PC (Geosyntec) was retained by Duke Energy to certify that this Closure Plan meets the requirements of 40 C.F.R. § 257.102. The information contained in this Closure Plan will be used to assist Duke Energy in the closure of the Active Ash Basin (Ash Basin) located in Wayne County, North Carolina, on property owned by Duke Energy. This Closure Plan may be amended pursuant to the requirements of 40 C.F.R. § 257.102(b)(3). Presented below are:

1. A narrative of closure activities;
2. A description of the procedures to remove CCR and decontaminate the CCR units;
3. An estimate of the in-place CCR inventory requiring closure;
4. An estimate of the largest area of the CCR units requiring a final cover (as needed);
5. A closure schedule; and
6. A written certification from a qualified professional engineer, licensed in North Carolina, that this Closure Plan meets the requirements of 40 C.F.R. § 257.102.

1 NARRATIVE OF CLOSURE ACTIVITIES

The purpose of this Closure Plan is to describe the steps necessary to close the Ash Basin consistent with recognized and generally accepted good engineering practices. Closure is designed to reduce the need for long-term maintenance and control the post-closure release of constituents into environmental pathways (i.e., air, surface water, and groundwater).

The Ash Basin will be closed by removal of CCR pursuant to 40 C.F.R. § 257.102(c). Procedures for CCR removal and decontamination are described in the following section.

Duke Energy is assessing the potential to site H.F. Lee for an ash beneficiation project pursuant to North Carolina General Statutes (N.C.G.S.) § 130A-309.216, as enacted by Section 1 of House Bill 630, Session Law 2016-95. If Duke Energy selects H.F. Lee for beneficiation purposes, to the extent that there is any remaining CCR in the Ash Basin after beneficiation operations have permanently ceased, the CCR will be moved to a permitted disposal facility.

2 CCR REMOVAL AND DECONTAMINATION

The procedures to remove CCR from the Ash Basin include dewatering and utilizing appropriate equipment and methods to excavate and move the CCR to a permitted disposal facility. Dewatering will include removal of bulk water/free liquids and interstitial/pore water (as needed) to allow for safe excavation and adequate compaction.

Existing appurtenant structures, such as ditches, culverts, and miscellaneous piping, will be decontaminated and abandoned in place, removed and disposed of in a permitted disposal

facility, or removed and processed at a beneficial use facility identified at the time of closure. Decontamination procedures may consist of pressure washing, scrubbing, or other generally accepted decontamination procedures.

Pursuant to 40 C.F.R. § 257.102(c), closure will be complete when groundwater monitoring concentrations do not exceed the applicable groundwater protection standard established pursuant to 40 C.F.R. § 257.95(h) for constituents listed in appendix IV to 40 C.F.R. Part 257.

3 ESTIMATE OF IN-PLACE CCR INVENTORY

The volume of CCR present in the Ash Basin was calculated and is presented in Table 1 below, pursuant to 40 C.F.R. § 257.102(b)(1)(iv). The volume is the estimated inventory of CCR that will be open (and require closure) at one time, and the estimate is based on bathymetric surveys, historical topography and soil borings as of July 2016. The annual surface impoundment inspections completed, pursuant to 40 C.F.R. § 257.83(b), and posted to the Duke Energy CCR website, pursuant to 40 C.F.R. § 257.107(g)(5), contain the most recent estimates of CCR material in the Ash Basin.

Table 1. Estimated In-Place CCR Inventory

Basin	Quantity of CCR (cubic yards)
Active Ash Basin	3,763,000

4 ESTIMATE OF LARGEST AREA REQUIRING FINAL COVER

CCR will be removed from the Ash Basin pursuant to 40 C.F.R. § 257.102(c); therefore, no final cover system will be constructed in support of closure activities.

5 CLOSURE SCHEDULE

Closure of the Ash Basin will be initiated pursuant to 40 C.F.R. § 257.102(e) and is anticipated to be completed within seven years of the commencement of closure activities. The closure time frame includes three two-year time extensions beyond the time specified in 40 C.F.R. § 257.102(f)(1)(ii) on the basis that the anticipated time required to close the Ash Basin will need to be lengthened due to:

- The Ash Basin being larger than 40 acres (estimated 130 acres); and
- The time required to develop a lined CCR placement solution in accordance with state and federal law.

Prior to commencing closure construction, design documents will be prepared to support applications for required local, state, and federal permits. Closure construction design

documents will include construction drawings, technical specifications, and quality assurance testing work plans. The permits required for closure construction activities will be evaluated at the time of closure and are anticipated to include permits from North Carolina Department of Environmental Quality (NCDEQ) and the U.S. Army Corps of Engineers. Preliminary time frames of anticipated closure activities for the Ash Basin pursuant to 40 C.F.R. § 257.102(b)(1)(vi) are included below in Table 2. Duke Energy estimates that the processing of CCR for beneficial use and closure activities for the Ash Basin will be completed by 2026. However, Duke Energy is assessing the potential to site an ash beneficiation project at H.F. Lee pursuant to N.C.G.S. § 130A-309.216. If deemed feasible, commencement of closure would not be initiated until the known final volume of CCR is removed from the CCR unit for the purpose of beneficial use pursuant to 40 C.F.R. § 257.102(e)(1)(ii). In such case, all of the closure activities for the Ash Basin will be completed by 2029. In the event H.F. Lee is selected as a beneficiation site, Duke Energy will amend this Closure Plan pursuant to the requirements of 40 C.F.R. § 257.102(b)(3).

Table 2. Estimated Time Frames for Closure Activities

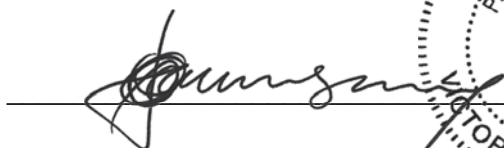
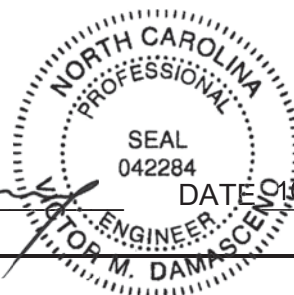
Closure Activity	Time Frame (years)*
NCDEQ Closure Plan Approval	1
NCDEQ Permitting Approvals (NDPES, E&SC, Air)	1
Dewatering and Stabilization	4.5
NCDEQ Dam Decommissioning Approval	0.5
CCR Excavation	6.5

*Estimated closure activity time frames may include some overlap and do not include beneficial use activities.

6 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Victor M. Damasceno, being a registered Professional Engineer in the state of North Carolina, do hereby certify to the best of my knowledge, information, and belief, that the information contained in this written Closure Plan dated October 10, 2016, was developed pursuant to the requirements of 40 C.F.R. § 257.102 and has been prepared consistent with recognized and generally accepted good engineering practices.

SIGNATURE

DATE 10 October 2016

H.F. Lee – Active Ash Basin
Closure Plan

Geosyntec
October 2016

Prepared by:



MAYO STEAM ELECTRIC PLANT
ASH BASIN
FGD FORWARD FLUSH POND
FGD SETTLING POND

CLOSURE PLAN

OCTOBER 10, 2016

Certified by:



6000 Fairview Road, Suite 200

Charlotte, NC 28210

License Number: C-2243

MAY_CLOSE_PLN

Rev. 0

Duke Energy Progress, LLC (Duke Energy) prepared this Closure Plan for the Coal Combustion Residuals (CCR) surface impoundment (Ash Basin) at the Mayo Steam Electric Plant (Mayo) pursuant to the requirements of 40 C.F.R. § 257.102(b) of the Disposal of CCR from Electric Utilities rule, 80 Fed. Reg. 21302 (April 17, 2015). URS Corporation – North Carolina (AECOM) was retained by Duke Energy to certify that this Closure Plan meets the requirements of 40 C.F.R. § 257.102. The information contained in this Closure Plan will be used to assist Duke Energy in the closure of the Ash Basin located in Person County, North Carolina, on property owned by Duke Energy. The Flue Gas Desulfurization (FGD) Forward Flush Pond and the FGD Settling Pond (collectively, FGD Ponds) are located within the Ash Basin footprint and will be included in its closure. This Closure Plan may be amended pursuant to the requirements of 40 C.F.R. § 257.102(b)(3). Presented below are:

1. A narrative of closure activities;
2. A description of the procedures to remove CCR and decontaminate the Ash Basin (as needed);
3. A description of the final cover system designed pursuant to 40 C.F.R. § 257.102(d), a description of the methods and procedures to be used to install the final cover, and a discussion of how the final cover system will achieve the performance standards specified in 40 C.F.R. § 257.102(d);
4. An estimate of the in-place CCR inventory requiring closure;
5. An estimate of the largest area of the Ash Basin requiring a final cover;
6. A closure schedule; and
7. A written certification from a qualified professional engineer, licensed in North Carolina, that this Closure Plan meets the requirements of 40 C.F.R. § 257.102.

1 NARRATIVE OF CLOSURE ACTIVITIES

The purpose of this Closure Plan is to describe the steps necessary to close the Ash Basin and FGD Ponds consistent with recognized and generally accepted good engineering practices. Closure is designed to reduce the need for long-term maintenance, control the post-closure infiltration of liquids into the in-place CCR materials, and control the post-closure release of constituents into environmental pathways (i.e., air, surface water, and groundwater).

Although, on May 18, 2016, the North Carolina Department of Environmental Quality (NCDEQ) ranked the Ash Basin “intermediate-risk,” which would require it to be dewatered and excavated pursuant to the North Carolina Coal Ash Management Act of 2014, as amended (CAMA), Duke Energy is in the process of establishing the permanent replacement water supplies required under N.C.G.S. § 130A-309.211(c1) and performing the applicable dam safety repair work required under Dam Safety Order 16-01 issued by the state of North Carolina pursuant to the North Carolina Dam Safety Law of 1967, specifically N.C.G.S. § 143-215.32. Pursuant to N.C.G.S. § 130A-309.213(d)(1), upon Duke Energy’s completion of these tasks within the required time frame set forth in CAMA, NCDEQ must classify the Ash Basin as low-risk, which will allow closure either pursuant to 40 C.F.R. § 257.102(c) or (d). Although CAMA charges NCDEQ with making the final determination regarding closure method, because science

supports closure of the Ash Basin by leaving the CCR in place, Duke Energy contemplates that the Ash Basin will be closed pursuant to 40 C.F.R. § 257.102(d).

The method to close the Ash Basin and FGD Ponds in place will include: removal and treatment of the bulk water/free liquids; interstitial/pore dewatering (as needed) and treatment; stabilization of remaining CCR materials sufficient to support the final cover system; grading of in-place CCR materials to promote positive drainage (no ponding) and prevent sloughing or movement of the final cover system; installation of a final cover system, including stormwater management controls; partial lowering of the dam; and post-closure groundwater monitoring and cover system maintenance. The final cover system will be designed to minimize infiltration and erosion to meet, or exceed, the requirements of the final cover system specified in 40 C.F.R. § 257.102(d)(3)(i). Typically, this involves the installation of a low permeability barrier layer and a vegetated soil cover to protect the barrier layer. Existing embankments will be lowered pursuant to a NCDEQ Dam Safety permit approval. This lowering is intended to promote free drainage of storm water from the closure area.

2 CCR REMOVAL AND DECONTAMINATION

There may be some areas, primarily located around the perimeter of the Ash Basin and FGD Ponds, where closure-by-removal is selected in order to enhance surface drainage and/or to allow for development of future plant infrastructure or transmission. In-place CCR in those areas will typically be dewatered (if needed), excavated, and consolidated (placed) into the remaining portion of the basin, which will be graded and closed-in-place pursuant to 40 C.F.R. § 257.102(d).

Existing appurtenant structures, such as ditches, culverts, and miscellaneous piping, will be decontaminated and abandoned in place, removed and disposed in a permitted disposal facility, or removed and placed in a beneficial use facility identified at the time of closure. Decontamination procedures may consist of pressure washing, scrubbing, or other generally accepted decontamination procedures.

Pursuant to 40 C.F.R. § 257.102(c), closure will be complete when groundwater monitoring concentrations do not exceed the applicable groundwater protection standard established pursuant to 40 C.F.R. § 257.95(h) for constituents listed in appendix IV to 40 C.F.R. Part 257.

3 FINAL COVER REQUIREMENTS

The final cover system for in-place closure of the Ash Basin and FGD Ponds will be designed pursuant to 40 C.F.R. § 257.102(d). Closure of the Ash Basin and FGD Ponds will be conducted in a manner that controls, minimizes, or eliminates, to the maximum extent feasible, the post-closure infiltration of liquids into the CCR and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere.

The final cover system being considered is a composite (soil and geosynthetics) cover system consisting of (from top to bottom):

- A six-inch layer of soil that is capable of sustaining native plant growth;
- An 18-inch thick protective soil cover layer;
- A geocomposite drainage layer or non-woven geotextile; and
- A 40-mil thick linear low-density polyethylene geomembrane barrier.

Alternative final cover systems are also under evaluation that would meet, or exceed, the requirements specified in 40 C.F.R. § 257.102(d)(3)(ii), which make use of the latest developments in final cover technology. The final cover system will serve to reduce erosion and post-closure maintenance. Various stormwater control measures (e.g., diversion berms, channels, downslope pipes, and/or downchutes) will convey surface run-off from the cover to sediment basins (as appropriate), prior to discharge until the site is stabilized by vegetation. The design of the stormwater conveyances will include armoring and energy dissipation measures, as necessary, to control erosion and reduce maintenance and repairs.

The final cover system, with an equivalent (or lower) permeability of any bottom liner system or natural subsoils present, or permeability no greater than 1×10^{-5} centimeters/second, will be constructed and maintained to minimize the infiltration of precipitation. By minimizing infiltration, the final cover will reduce the potential of leachate generation. The final cover system will be graded to preclude the probability of future impoundment of water, sediment, or slurry.

The Ash Basin and FGD Ponds will be closed in a manner resulting in stable slopes that prevent the sloughing or movement of the final cover system. The grades of the final cover system will be generally slight, sufficient to promote run-off while reducing the potential for sloughing. Instability potential (sliding or sloughing) is further reduced through the selection and use of cover system materials that have adequate drainage properties and sufficient internal and interface shear strengths. Construction quality assurance procedures will be completed to confirm conformance of the installed final cover system to the design.

Upon commencement of closure of the Ash Basin and FGD Ponds, final closure is anticipated to be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices. Section 6, Closure Schedule, of this Closure Plan describes estimated time frames.

3.1 FINAL COVER SYSTEM

Pursuant to 40 C.F.R. § 257.102(d)(3)(i)(A) through (D), the final cover system will be designed and constructed to meet, at a minimum, the following criteria:

- (A) The permeability of the final cover system will be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} centimeters/second, whichever is less.

The final cover system options being considered for the Ash Basin and FGD Ponds will meet or exceed these criteria. The geomembrane by itself results in a

lower effective infiltration rate than the 18 inches of 1×10^{-5} centimeters/second soil standard.

- (B) The infiltration of liquids through the Ash Basin and FGD Ponds will be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.

The geomembrane component in the final cover system results in equivalent or better infiltration performance than 18 inches of earthen material. The proposed protective cover (18 inches) and vegetative layer soil will be obtained from local borrow sites and/or portions of the dams and dikes that will be lowered during closure. The gradation of the soil used in the cover will be such that it does not damage the geomembrane, provides drainage, resists erosion, and supports plant growth.

- (C) The erosion of the final cover system will be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.

The materials proposed for the vegetative support layer in the composite cover system option, or the protective cover component of an alternate final cover system, will provide equivalent or better performance than a six-inch-thick erosion layer. In addition, and prior to the completion of closure, stormwater run-off and wastewaters generated from areas outside the Ash Basin and FGD Pond's drainage catchment (which had previously been routed through the basin when it was active) will be permanently diverted for treatment (as needed) and discharge at other locations within the site.

- (D) The disruption of the integrity of the final cover system will be minimized through a design that accommodates settling and subsidence.

The materials proposed for the final cover systems will accommodate the amount of settlement and subsidence that is anticipated to be encountered during construction and post-closure. In addition, the cover grades and stormwater conveyance system grades will be designed to accommodate settlement during construction and post-closure care.

The methods and procedures used to install the final cover will include:

1. Completing necessary field characterizations and design analyses;
2. Obtaining necessary federal, state, and local permits;
3. Preparing bid documents and selecting a qualified contractor;
4. Mobilizing;
5. Installing erosion and sediment control measures;
6. Removing and treating (as needed) the bulk water/free liquid;
7. Decontaminating and abandoning in place or removing the appurtenant structures within the Ash Basin and FGD Ponds;
8. Clearing and grubbing;

9. Constructing laydown areas and access roads;
10. Interstitial/pore dewatering and treatment (as needed);
11. Grading CCR materials to achieve design cover system subgrade elevations;
12. Installing the cover system and associated stormwater management controls;
13. Stabilizing the site with appropriate vegetation and final erosion and sediment control measures;
14. Lowering of the dam; and
15. Commencing post-closure maintenance and monitoring of the site.

3.2 DRAINAGE AND STABILIZATION

Bulk water/free liquids will be removed from the Ash Basin and FGD Ponds throughout multiple phases of construction. Interstitial/pore water may be removed and treated during construction (as needed) to provide a workable surface for final cover system installation. With the diversion of wastewater and the stormwater discharged to the basin from other locations on the site, the volume of interstitial/pore water within the basin is expected to further decline over time. The dam will be lowered following the final phase of cover system installation. Combined, these measures (diversion of wastewater and stormwater, bulk dewatering, selective interstitial/pore dewatering, cover system installation, and dam lowering) will stabilize the CCR materials sufficiently to support the final cover system.

4 ESTIMATE OF IN-PLACE CCR INVENTORY

The volume of CCR present in the Ash Basin and FGD Ponds was calculated and is presented in Table 1 below, pursuant to 40 C.F.R. § 257.102(b)(1)(iv). The volume is the estimated inventory of CCR that will be open (and require closure) at one time, and the estimate is based on bathymetric surveys, historical topography, and soil borings as of December 2015. The annual surface impoundment inspections completed, pursuant to 40 C.F.R. § 257.83(b), and posted to the Duke Energy CCR website, pursuant to 40 C.F.R. § 257.107(g)(5), contain the most recent estimates of CCR material in the Ash Basin.

Table 1. Estimated In-Place CCR Inventory

Basin	Quantity of CCR (cubic yards)
Ash Basin	5,271,000
FGD Settling Pond	186,000
FGD Forward Flush Pond	43,000
Total Inventory Within Ash Basin Footprint	5,500,000

5 ESTIMATE OF LARGEST AREA REQUIRING FINAL COVER

Closure of the Ash Basin will be accomplished by leaving CCR in place pursuant to 40 C.F.R. § 257.102(d). The largest area of the Ash Basin that will be open (and require a final cover) at one

time is estimated to be 140 acres. The FGD Ponds are located within the Ash Basin footprint and are included in the area requiring final cover.

6 CLOSURE SCHEDULE

Closure of the Ash Basin and FGD Ponds will be initiated pursuant to 40 C.F.R. § 257.102(e) and is anticipated to be completed within seven years of the commencement of closure activities. The closure time frame includes a two-year time extension beyond the time specified in 40 C.F.R. § 257.102(f)(1)(ii) on the basis that the anticipated time required to close the Ash Basin and FGD Ponds will need to be lengthened due to:

- The Ash Basin being larger than 40 acres (estimated 140 acres);
- The amount of imported material needed to close the Ash Basin and FGD Ponds (estimated to be greater than 250,000 cubic yards);
- The volume of CCR (greater than 1.1 million cubic yards will need to be excavated and placed as grading fill);
- The volume of bulk water/free liquids to dewater (greater than 450 million gallons);
- The surrounding geology (shallow rock resulting in limited soil volume per given area, limited availability of soil meeting the permeability requirements outlined in the CCR Rule, rocks in the soil that could damage the geomembrane would need to be removed, etc.); and
- The time required, after the removal of bulk liquids, for the surface of the basin to stabilize to the point that personnel and equipment can safely access the impoundment. Given the site-specific geometry and physical characteristics of the CCR in the impoundment, the rate at which the materials will drain will likely be slow and variable. As a result, installation of instrumentation and monitoring equipment may be necessary in some instances to ensure subgrade stability is adequate, and other measures may need to be employed to stabilize the surface of the impoundment (possibly including closely-spaced well points, deep wells, trenches, etc.) in a timely manner.

The completed demonstration establishing why it is not feasible to complete closure of the Ash Basin and FGD Ponds within the five-year time frame due to factors beyond the facility's control will be prepared and placed in the facility's operating record prior to the end of any two-year period pursuant to 40 C.F.R. § 257.102(f)(2).

Prior to commencing closure construction, design documents will be prepared to support applications for required local, state, and federal permits. Closure construction design documents will include construction drawings, technical specifications, and quality assurance testing work plans. The permits required for closure construction activities will be evaluated at the time of closure and are anticipated to include permits from NCDEQ and the U.S. Army Corps of Engineers. Preliminary time frames of anticipated closure activities for the Ash Basin and FGD Ponds are included below in Table 2. Duke Energy estimates that all of the closure activities for the Ash Basin and FGD Ponds will be completed by 2026.

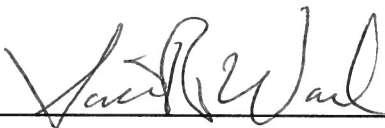
MAY_CLOSE_PLN
Rev. 0**Table 2. Estimated Time Frames for Closure Activities**

Closure Activity	Time Frame (years)*
NCDEQ Closure Plan Approval	1
NCDEQ Permitting Approvals (NDPES, E&SC, Air)	1
Dewatering and Stabilization	2.5
CCR Grading and Excavation	1.5
NCDEQ Dam Decommissioning Approval	0.5
Final Cover Installation	3.5

*Estimated closure activity time frames may include some overlap

7 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, SCOTT R. WARD, being a registered Professional Engineer in the state of North Carolina, do hereby certify to the best of my knowledge, information, and belief, that the information contained in this written Closure Plan dated October 10, 2016, was developed pursuant to 40 C.F.R. § 257.102 and has been prepared in accordance with recognized and generally accepted good engineering practices.

SIGNATURE  DATE 10/10/2016





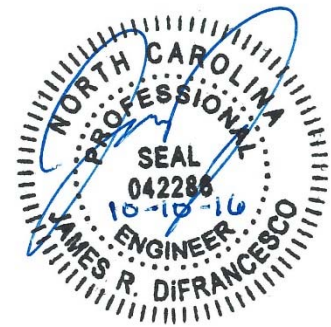
CLOSURE PLAN

CLOSURE PLAN

Mayo CCR Monofill Landfill

Submitted To: Duke Energy Progress, LLC.
526 S. Church Street
Charlotte, NC 28202

Submitted By: Golder Associates NC, Inc.
5B Oak Branch Drive
Greensboro, NC 27407



Distribution: Evan Andrews, PE (Duke Energy)

October 2016

Project No. 1533278

MAY_AM_CLOSE_LDFL_PLN





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1.0 INTRODUCTION

This Closure Plan was prepared for the Mayo Plant (Mayo) – Coal Combustion Residuals (CCR) Monofill. This Closure Plan was prepared in accordance with 40 C.F.R. Part 257, Subpart D and is consistent with the requirements of 40 C.F.R. §257.102(b) for closure of CCR landfills. The information contained in this Closure Plan will be used to assist Duke Energy Progress, LLC (Duke Energy) in the closure of active waste units. The Mayo CCR Monofill is owned and operated by Duke Energy. The landfill is located in Person County, North Carolina on Duke property, east of the Mayo Plant and the Mayo Reservoir. Duke Energy must obtain a written certification from a qualified professional engineer, licensed in the state in which the project work is conducted, that this written Closure Plan and any amendments thereto meet the requirements of 40 C.F.R. §257.102 (see Section 3.0).

2.0 CLOSURE PLAN

2.1 Overview of Closure Approach

The purpose of the Closure Plan is to outline the steps necessary to close the landfill phases consistent with recognized and generally accepted good engineering practices. Closure is designed to minimize the need for long-term maintenance and to control the post-closure release of contaminants. The facility will be closed in accordance with the requirements of 40 C.F.R. §257.102. Closure will occur within the time frames set out in 40 C.F.R. §257.102(f). This Closure Plan may be amended in accordance with the requirements of 40 C.F.R. §257.102(b)(3).

2.2 Estimated Maximum Inventory of CCR

The current landfill design provides approximately 16,900,000 cubic yards of gross capacity as measured from the top of the protective cover soil to the top of final cover. Currently, the only active portion of the landfill is Phase 1, which has a 31.0-acre footprint and a gross capacity estimated to be 1,592,000 cubic yards.

2.3 Largest Area Requiring Cover System

The Phase 1 permitted area of 31.0 acres is currently the largest area that will need to be capped.

2.4 Closure Performance Standard

2.4.1 Final Cover

The cover system has been designed to minimize infiltration into the landfill and to resist erosion. The permeability of the least permeable layer in the final cover system is 1×10^{-12} centimeter per second (cm/sec). This is equal to or less than the permeability of the least permeable layer in the bottom liner system and no greater than 1×10^{-5} cm/sec.

The final cover system for the closed phase will be certified by a qualified professional engineer as being designed in accordance with the requirements of 40 C.F.R. §257.102.

With the type of waste that has been landfilled and the controlled nature of the fill placement, no decomposition of the waste material is expected; therefore, minimum, if any, settlement is expected. Due to the high allowable strain of the geomembrane and the stable nature of the waste, the final cover system will accommodate any differential settlement that may occur in the waste during the post-closure care period.

The proposed final cover system will consist of the following, from top to bottom, and will be placed over the top of the landfilled CCR materials:

- 6-inch-thick vegetated erosion layer



- 18-inch-thick protective cover soil barrier
- Geocomposite drainage layer
- 40-mil-thick double-sided textured linear low density polyethylene (LLDPE) geomembrane
- 12 inches of intermediate soil cover

2.4.2 *Alternate Final Cover*

No alternate final cover system is proposed.

2.4.3 *Performance Standard*

Closure of the facility will be conducted in a manner that minimizes the need for further maintenance and controls, and minimizes or eliminates, to the extent necessary to protect human health and the environment, the post-closure escape of uncontrolled leachate, surface runoff, or waste products to the groundwater, surface water, or the atmosphere.

The final cover system consisting of a vegetated soil layer with run-on and run-off controls will minimize the need for post-closure maintenance. The final slopes of the landfill will promote runoff. Diversion berms and downslope pipes will convey surface runoff to sediment basins designed to remove sediment prior to discharge. Vegetation will be established and, along with the diversion berms and storm water conveyance channels, will minimize erosion of the final cover system.

A low-permeability final cover system will be constructed and maintained that minimizes the infiltration of precipitation into the waste mass. By minimizing infiltration, the final cover will minimize leachate generation.

The final slopes of the landfill will not be less than 5 percent to prevent ponding.

The CCR unit will be closed in a manner that provides for slope stability to prevent the sloughing or movement of the final cover system. Both global and veneer stability analyses were performed in order to determine the minimum factors of safety against failure.

The minimum factor of safety for global static stability was found to be greater than 1.5, and the minimum factor of safety for seismic global stability was found to be greater than 1.0 in accordance with sound engineering practices for landfill final cover design.

The minimum factor of safety for static veneer stability was found to be greater than 1.5, and the minimum factor of safety for seismic veneer stability was found to be greater than 1.0 in accordance with sound engineering practices for landfill final cover design.

The final cover system will be finished within 6 months following the beginning of closure construction unless otherwise approved. If more than 6 months are necessary, steps to prevent threats to human health and the environment from the unclosed landfill unit will be undertaken.

2.5 *Schedule*

In accordance with 40 C.F.R. §257.102(e), the facility will begin closure activities within 30 days after the known final receipt of waste, or if the landfill has remaining capacity and there is a reasonable likelihood that the landfill will receive additional wastes, no later than 2 years after the most recent receipt of wastes. Contractor mobilization will occur during the initial 30-day period after last known receipt of waste.



In accordance with 40 C.F.R. §257.102(g), no later than the date on which closure of the CCR unit is initiated, Duke Energy will prepare a notification of intent to close the unit, which includes the certification by a qualified professional engineer for the design of the final cover system required by §257.102(d)(3)(iii).

In accordance with 40 C.F.R. §257.102(h), within 30 days following completion of closure of the CCR unit, Duke Energy shall record a notation on the deed to the landfill property stating that the property has been used as a landfill and its use is restricted under the Post-closure Plan and the post-closure care requirements as provided by 40 C.F.R. §257.104(d)(1)(iii).

Within 30 days of recording the notation, Duke Energy shall prepare a notification stating that the notation has been recorded and placed in the facility's operating record. Pursuant to 40 C.F.R. §257.106(d), Duke Energy shall send to the appropriate regulatory agency the notification of intent to close, notification of closure completion, and notification of deed notation, within 30 days of placing each notification in the operating record.

An expected schedule for closure activities is as follows:


Schedule for Closure Activities	
Time	Activity
Prior to last receipt of waste	Permitting, detailed closure design, and contractor selection
Initial 30 days after last receipt of waste	Mobilization of contractor
Months 0-1 after beginning construction	Grading / preparing intermediate cover
Months 1-4 after beginning construction	Installation of geomembrane, geocomposite drainage layer, and protective cover soil and vegetation layer
Months 4-5 after beginning construction	Installation of diversion berms and downslope drainage pipes
Months 5-6 after beginning construction	Seed, fertilizer, and mulch

3.0 PROFESSIONAL ENGINEER CERTIFICATION

I, James R. DiFrancesco, being a registered Professional Engineer, in accordance with the North Carolina Professional Engineer's Registration, do hereby certify to the best of my knowledge, information, and belief, that the information contained in this report dated October 10, 2016, was prepared in accordance with the requirements of 40 C.F.R. §257.102, is true and correct, and was prepared in accordance with recognized and generally accepted good engineering practices.

The use of the word "certification" and/or "certify" in this document shall be interpreted and construed as a Statement of Professional Opinion, and is not and shall not be interpreted or construed as a guarantee, warranty, or legal opinion

GOLDER ASSOCIATES NC, INC.


Ron DiFrancesco, PE
Principal and Practice Leader

Established in 1960, Golder Associates is a global, employee-owned organization that helps clients find sustainable solutions to the challenges of finite resources, energy and water supply and management, waste management, urbanization, and climate change. We provide a wide range of independent consulting, design, and construction services in our specialist areas of earth, environment, and energy. By building strong relationships and meeting the needs of clients, our people have created one of the most trusted professional services organizations in the world.

Kerin Exhibit 9
Closure Plans
Page 22 of 44
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Prepared by:



H.B. ROBINSON STEAM ELECTRIC PLANT
ASH BASIN

CLOSURE PLAN

OCTOBER 10, 2016

Certified by:



HDR Engineering, Inc. of the Carolinas

440 S. Church Street, Suite 1000

Charlotte, NC 28202

South Carolina Certificate of Authorization No. C0318

ROB_CLOSE_PLN

Rev. 0

Duke Energy Progress, LLC (Duke Energy) prepared this Closure Plan for the Coal Combustion Residuals (CCR) surface impoundment (Ash Basin) at the H.B. Robinson Steam Electric Plant (Robinson) pursuant to the requirements of 40 C.F.R. § 257.102(b) of the Disposal of CCR from Electric Utilities rule, 80 Fed. Reg. 21302 (April 17, 2015) (CCR Rule). HDR Engineering, Inc. of the Carolinas (HDR) was retained by Duke Energy to certify that this Closure Plan meets the requirements of 40 C.F.R. § 257.102. The information contained in this Closure Plan will be used to assist Duke Energy in the closure of the Ash Basin located in Darlington County, South Carolina, on property owned by Duke Energy. This Closure Plan may be amended pursuant to the requirements of 40 C.F.R. § 257.102(b)(3). Presented below are:

1. A narrative of closure activities;
2. A description of the procedures to remove CCR and decontaminate the CCR unit;
3. An estimate of the in-place CCR inventory requiring closure;
4. An estimate of the largest area of the CCR unit requiring a final cover (as needed);
5. A closure schedule; and
6. A written certification from a qualified professional engineer, licensed in South Carolina, that this Closure Plan meets the requirements of 40 C.F.R. § 257.102.

1 NARRATIVE OF CLOSURE ACTIVITIES

The purpose of this Closure Plan is to describe the steps required to close the Ash Basin at Robinson consistent with recognized and generally accepted good engineering practices. Closure of the Ash Basin will be designed to reduce the need for long-term maintenance and control the post-closure release of constituents into environmental pathways (i.e., air, surface water, groundwater).

The Ash Basin will be closed through the removal of CCR, and the closure will be performed pursuant to 40 CFR § 257.102(c). CCR will be removed as described in the following section.

2 CCR REMOVAL AND DECONTAMINATION

The procedures to remove CCR from the Ash Basin include dewatering and utilizing appropriate equipment and methods to excavate and move the CCR to a permitted on-site landfill. Dewatering will include removal of bulk water/free liquids and interstitial/pore water (as needed) to allow for safe excavation.

The existing embankment will be breached pursuant to a South Carolina Department of Health and Environmental Control (SCDHEC) Dam Safety permit approval. This breach is intended to promote free drainage of storm water from the closure area.

Existing appurtenant structures, such as ditches, culverts, and miscellaneous piping, will be decontaminated and abandoned in place, or removed and disposed in a permitted disposal facility, or placed in a beneficial use facility identified at the time of closure. Decontamination

procedures may consist of pressure washing, scrubbing, or other generally accepted decontamination procedures.

Pursuant to 40 C.F.R. § 257.102(c), closure will be complete when groundwater monitoring concentrations do not exceed the applicable groundwater protection standard established pursuant to 40 C.F.R. § 257.95(h) for constituents listed in appendix IV to 40 C.F.R. Part 257.

3 ESTIMATE OF IN-PLACE CCR INVENTORY

The volume of CCR present in the Ash Basin was calculated and is presented in Table 1 below, pursuant to 40 C.F.R. § 257.102(b)(1)(iv). The volume is the estimated inventory of CCR that will be open (and require closure) at one time, and the estimate is based on bathymetric surveys, historical topography, and soil borings as of May 2016. The annual surface impoundment inspections completed, pursuant to 40 C.F.R. § 257.83(b), and posted to the Duke Energy CCR website, pursuant to 40 C.F.R. § 257.107(g)(5), contain the most recent estimates of CCR material in the Ash Basin.

Table 1. Estimated In-Place CCR Inventory

Basin	Quantity of CCR (cubic yards)
Ash Basin	2,632,000

4 ESTIMATE OF LARGEST AREA REQUIRING FINAL COVER

Closure of the Ash Basin will be accomplished by closure-by-removal pursuant to 40 C.F.R. § 257.102(c); therefore, no final cover will be constructed in support of closure.

5 CLOSURE SCHEDULE

Closure of the Ash Basin will be initiated pursuant to 40 C.F.R. § 257.102(e) and is anticipated to be completed within seven years of the commencement of closure activities. The closure time frame includes a two-year time extension beyond the time specified in 40 C.F.R. § 257.102(f)(1)(ii) on the basis that the anticipated time required to close the Ash Basin will need to be lengthened due to:

- The Ash Basin being larger than 40 acres (estimated 72 acres); and
- The need to relocate transmission lines to close a non-CCR-Rule-regulated ash storage area subject to Consent Agreement 15 – 23 – HW with the state of South Carolina.

The completed demonstration establishing why it is not feasible to complete closure of the Ash Basin within the five-year time frame due to factors beyond the facility's control will be prepared and placed in the facility's operating record prior to the end of any two-year period pursuant to 40 C.F.R. § 257.102(f)(2).

Prior to commencing closure construction, design documents will be prepared to support applications for required local, state, and federal permits. Closure construction design documents will include construction drawings, technical specifications, and quality assurance testing work plans. The permits required for closure construction activities will be evaluated at the time of closure, and but are anticipated to include permits from SCDHEC and the U.S. Army Corps of Engineers. Preliminary time frames of anticipated closure activities are included below in Table 2. Duke Energy estimates that all of the closure activities for the Ash Basin will be completed by 2026.

Table 2. Estimated Time frames for Closure Activities

Closure Activity	Time Frame (years)*
SCDHEC Closure Plan Approval	1
SCDHEC Landfill Permit Approval	1.5
SCDHEC Permitting Approvals (NDPES, E&SC, Air)	1
Dewatering and Stabilization	1.5
SCDHEC Dam Decommissioning Approval	0.5
CCR Excavation	3

*Estimated closure activity time frames may include some overlap.

6 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Philip A. Westmoreland being a registered Professional Engineer in the state of South Carolina, do hereby certify to the best of my knowledge, information, and belief, that the information contained in this written Closure Plan dated October 10, 2016, was developed pursuant to the requirements of 40 C.F.R. § 257.102 and has been prepared in accordance with recognized and generally accepted good engineering practices.

SIGNATURE

DATE Oct 10, 2016



Prepared by:



ROXBORO STEAM ELECTRIC PLANT

EAST ASH BASIN

WEST ASH BASIN

EAST FGD SETTLING POND

WEST FGD SETTLING POND

FGD FORWARD FLUSH POND

POST-CLOSURE PLAN

OCTOBER 12, 2016

Certified by:



Amec Foster Wheeler Environment & Infrastructure, Inc.

2801 Yorkmont Road Suite #100

Charlotte, NC 28208

License Number: F-1253

ROX_POST_CLOSE_PLN

Rev. 0

POST-CLOSURE PLAN

1.0 INTRODUCTION

This Post-Closure Plan was prepared for the coal combustion residuals (CCR) surface impoundments: East Ash Basin, West Ash Basin, East Flue Gas Desulfurization (FGD) Settling Pond, West FGD Settling Pond, and the FGD Forward Flush Pond (collectively, Ash Basins and FGD Ponds) at the Roxboro Steam Electric Plant owned and operated by Duke Energy Progress, LLC (Duke Energy). This Post-Closure Plan was prepared pursuant to 40 C.F.R. Part 257, Subpart D and is consistent with the requirements of 40 C.F.R. § 257.104(d) for post-closure care of CCR units. The information contained in this Post-Closure Plan will be used to assist Duke Energy in the maintenance and monitoring required during the post-closure period. The Ash Basins and FGD Ponds are located in Person County, North Carolina on Duke Energy property.

Amec Foster Wheeler Environmental and Infrastructure, Inc. – North Carolina (AMEC FW) was retained by Duke Energy to certify that this Post-Closure Plan meets the requirements of Section 257.104(d)(4) of the CCR Rule. This Post-Closure Plan may be amended pursuant to the requirements of 40 C.F.R. § 257.104.

2.0 POST-CLOSURE PLAN

2.1 Facility Contact Information

The post-closure maintenance of Ash Basins and FGD Ponds will be the responsibility of Duke Energy. Correspondence should be directed to:

Duke Energy Progress, LLC
Corporate Headquarters
526 South Church Street
Charlotte, NC 28202
800.777.9898
Email: CoalAshQuestions@duke-energy.com

2.2 Post- Closure Care Maintenance

Post-closure monitoring will be conducted semi-annually during the post-closure period. The following system components will be monitored:

- surface water management systems for signs of erosion, sedimentation, and condition;
- cover system for signs of erosion;
- cover system for evidence of settlement or subsidence;

- condition and/or presence of desired vegetation;
- condition and/or presence of undesired vegetation (distressed, dying vegetation, or woody vegetation);
- condition of the groundwater monitoring wells; and
- condition of access paths to monitoring wells.

2.2.1 Final Cover

Maintenance activities will be required to maintain the integrity and effectiveness of the final cover system. Repairs will correct effects of settlement, subsidence, erosion, or other events, and prevent run-on and run-off from eroding or otherwise damaging the final cover. The vegetative cover will be amended and fertilized as needed to maintain healthy vegetation. Depressions in the cover that pond water or otherwise impair the function of the final cover will be repaired as necessary. Areas subject to repair will be revegetated. Animal burrows and eroded areas will be filled with soil and revegetated. If vegetative cover is not adequate in a particular area, fertilizer will be applied and the area reseeded in order to reestablish vegetation. Any deep-rooted or woody vegetation that may have established itself on the cover soil will be removed.

2.2.2 Leachate Collection and Removal System

The Ash Basins and FGD Ponds are not subject to 40 C.F.R. § 257.70, therefore maintaining the integrity and effectiveness of the leachate collection and removal system does not apply.

2.2.3 Groundwater Monitoring System

The groundwater monitoring system and monitoring will be maintained pursuant to 40 C.F.R. § 257.90 through 257.98. The groundwater monitoring system will be sampled semi-annually (or as required) during the post-closure care period. The results of the analytical testing will be reported as indicated in the Groundwater Monitoring Plan. Routine well maintenance will include inspection and correction/repair of, as necessary, identification labels, concrete pads, protective covers and locks, and access paths/roads to the wells. Should a well be rendered unusable, the well will be abandoned pursuant to applicable regulations and guidelines, and a new well will be permitted and installed, as may be required.

2.3 Property Use

During the post-closure care period, cover systems for the Ash Basins and FGD Ponds will be maintained. Duke Energy will maintain control of, and limit access to, the facility. No post-closure use is proposed at this time. In the event the post-closure

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planned use is changed, Duke Energy will amend this Post-Closure Plan to reflect such change.

No later than 60 days following the completion of the post-closure care period, Duke Energy will prepare a notification verifying that post-closure care has been completed. The notification will include a certification by a qualified professional engineer verifying that post-closure care has been completed pursuant to this Post-Closure Plan and the requirements of 40 C.F.R. § 257.104.

3.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, David Garrett, being a registered Professional Engineer in the State of North Carolina, do hereby certify to the best of my knowledge, information and belief, that the information contained in this written Post-Closure Plan dated October 12, 2016 was developed pursuant to the requirements of 40 C.F.R. § 257.104(d) and has been prepared pursuant to recognized and generally accepted good engineering practices.

SIGNATURE



DATE

10-12-2016

CLOSURE PLAN

ROXBORO INDUSTRIAL LANDFILL

DUKE ENERGY – ROXBORO STEAM STATION

SEMORA, NORTH CAROLINA

Prepared for



Duke Energy
550 South Tryon Street
Charlotte, North Carolina 28202

October 7, 2016
ROX_AL_CLOSE_LDFL_PLN



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1.0 INTRODUCTION

This Closure Plan was prepared for the Roxboro Steam Station – Roxboro Industrial Landfill. This Closure Plan was prepared in accordance with 40 C.F.R. Part 257, Subpart D and is consistent with the requirements of 40 C.F.R. § 257.102(b) for closure of coal combustion residuals landfills. The information contained in this Closure Plan will be used to assist Duke Energy Progress, LLC (Duke Energy) in the closure of active waste units. The Roxboro Industrial Landfill is owned and operated by Duke Energy. The landfill is located in Person County, North Carolina on Duke property, southeast of the Roxboro Steam Plant, within the drainage area of the East Ash Basin. Duke Energy must obtain a written certification from a qualified professional engineer, licensed in the state in which the project work is conducted, that this written Closure Plan and any amendments thereto meet the requirements of 40 C.F.R. § 257.102.

2.0 CLOSURE PLAN

2.1 Overview of Closure Approach

The purpose of the Closure Plan is to outline the sequence for closing the landfill phases consistent with recognized and generally accepted good engineering practices. Closure is designed to minimize the need for long term maintenance and to control the post-closure release of contaminants. The facility will be closed in accordance with the requirements of 40 C.F.R. § 257.102. Closure will occur within the time frames set out in 40 C.F.R. § 257.102(f). This Closure Plan may be amended in accordance with the requirements of 40 C.F.R. § 257.102(b)(3).

2.2 Estimated Maximum Inventory of CCR

The currently permitted landfill design for Phases 1 through 6 provides approximately 7,448,000 cubic yards of gross capacity as measured from the top of the protective cover soil to the top of final cover.

2.3 Largest Area Requiring Cover System

The largest area that will need to be capped is the area of Phases 1 through 6, which is stated as 93.0 acres in the facility's solid waste permit.

2.4 Closure Performance Standard

2.4.1 Final Cover

The cover system has been designed to reduce infiltration into the landfill and to resist erosion, and to meet the requirements of 40 C.F.R. § 257.102(d)(3)(i). The permeability of the least permeable layer (a polyethylene geomembrane) is on the order of 10^{-12} cm/s. This is equal to or

less than the permeability of the polyethylene geomembrane in the bottom liner system and no greater than 1×10^{-5} cm/sec.

The final cover system for the closed phase will be certified by a professional engineer as being designed in accordance with the requirements of 40 C.F.R. § 257.102.

With the type of waste that has been landfilled and the controlled nature of the fill placement, no decomposition of the waste material is expected, therefore minimum, if any, settlement is expected. Due to the high allowable strain of the geomembrane and the stable nature of the waste, the final cover system will accommodate any differential settlement that may occur in the waste during the post closure care period.

The proposed final cover system will consist of the following from top to bottom and will be placed over the existing intermediate soil cover:

- a 6-inch thick vegetative soil cover;
- an 18-inch thick soil cover;
- a geocomposite drainage layer; and
- a 40-mil thick double-sided textured linear low density polyethylene (LLDPE) geomembrane.

2.4.2 Alternate Final Cover

No alternate final cover system is proposed.

2.4.3 Performance Standards

Closure of the facility will be conducted in a manner that minimizes the need for further maintenance and controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, the post-closure escape of uncontrolled leachate, surface runoff, or waste decomposition products to the groundwater, surface water, or the atmosphere.

The final cover system consisting of a vegetated soil layer with run-on and run-off controls will minimize the need for post-closure maintenance. The final slopes of the landfill will promote runoff. Diversion berms and downslope pipes will convey surface runoff to conveyances with non-erodible linings or, if applicable, to sediment basins designed for removal of sediment prior to discharge. A hardy stand of vegetation will be established and, along with the diversion berms and storm water conveyance channels, will minimize erosion of the final cover system.

A low-permeability final cover system will be constructed and maintained that minimizes the infiltration of precipitation into the waste mass. By minimizing infiltration, the final cover will minimize leachate generation.

The final slopes of the landfill will be five percent or greater to prevent ponding.

2.4.4 Stability

The CCR unit will be closed in a manner that provide for slope stability to prevent the sloughing or movement of the final cover system. In order to maintain stable slopes for the final cover, the internal and interface friction angles of all the components must be greater than the slope angle by a margin called a factor of safety. Since the maximum regulatory slopes are 3:1, only materials with friction angles greater than 26.6° will be used, providing a minimum factor of safety of 1.5. To ensure the stability of the vegetative support layer in the final cover system, adequate drainage must be provided to prevent the soil from becoming saturated and subject to seepage forces.

An analysis was also performed to demonstrate the stability of proposed cap section during seismic conditions. An acceptable factor of safety is 1.0 or greater to guard against slope failure. The analysis was performed in accordance with the requirements of 40 C.F.R. § 257.63 and the seismic factor of safety was found to be greater than 1.0.

2.4.5 Closure Time Frame

The final cover system will be finished within six months following the beginning of closure construction unless otherwise approved. If more than six months are necessary, steps to prevent threats to human health and the environment from the unclosed landfill unit will be undertaken.

2.5 Schedule

In accordance with 40 C.F.R. § 257.102(e), the facility will begin closure activities within 30 days after final receipt of waste, or if the landfill has remaining capacity and there is a reasonable likelihood that the landfill will receive additional wastes, no later than two years after the most recent receipt of wastes. Contractor mobilization will occur during the initial 30 day period after last receipt of waste.

In accordance with 40 C.F.R. § 257.102(f)(1), the final cover system will be completed within six months following the beginning of closure construction unless a deadline extension is approved.

In accordance with 40 C.F.R. § 257.102(g), no later than the date on which closure of the CCR unit is initiated, prepare a notification of intent to close the unit, which includes the certification by a qualified professional engineer for the design of the final cover system required by § 257.102(d)(3)(iii).

In accordance with 40 C.F.R. § 257.102(h), within 30 days of completion of closure, Duke Energy shall record a notation on the deed to the landfill property stating that the property has been used as a landfill and its use is restricted under the Closure/Post-Closure Plan and the post-closure care requirements as provided by 40 C.F.R. § 257.104(d)(1)(iii).

Within 30 days of recording the notation, Duke Energy shall prepare a notification stating that that the notation has been recorded and placed it into the facility's operating record. Pursuant

to 40 C.F.R. § 257.106(d), Duke Energy shall send to the appropriate regulatory agency the notification of intent to close, notification of closure completion, and notification of deed notation, within 30 days of placing each such notification in the operating record.

An expected schedule for closure activities is as follows:

<u>Time</u>	<u>Activity</u>
Prior to last receipt of waste	Permitting, detailed closure design and selection contractor
Initial 30 days after last receipt of waste	Mobilization of contractor
Months 0-1 after beginning construction	Grading /preparation of intermediate cover
Months 1-4 after beginning construction	Placement of soil layer and/or flexible membrane liner, and soil protective layers
Months 4-5 after beginning construction	Installation of diversion berms and downslope pipes
Months 5-6 after beginning construction	Seed, fertilize and mulch

3.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Thomas B. Maier, being a registered Professional Engineer, in accordance with the North Carolina Professional Engineer's Registration do hereby certify to the best of my knowledge, information, and belief, that this report dated October 7, 2016 was prepared in accordance with the requirements of 40 C.F.R. § 257.102, is true and correct, and has been prepared in accordance with recognized and generally accepted good engineering practices.

Prepared by:



L.V. SUTTON ENERGY COMPLEX
1971 ASH BASIN
1984 ASH BASIN

CLOSURE PLAN

MARCH 7, 2017

Certified by:



Geosyntec Consultants of NC, PC
1300 South Mint Street, Suite 300
Charlotte, North Carolina 28203
License No. C-3500

SUT_CLOSE_PLN

Rev. 1

Duke Energy Progress, LLC (Duke Energy) prepared this Closure Plan for the Coal Combustion Residuals (CCR) surface impoundments at the L.V. Sutton Energy Complex (Sutton) pursuant to the requirements of 40 C.F.R. § 257.102(b) of the Disposal of CCR from Electric Utilities rule, 80 Fed. Reg. 21302 (April 17, 2015). Geosyntec Consultants of NC, PC (Geosyntec) was retained by Duke Energy to certify that this Closure Plan meets the requirements of 40 C.F.R. § 257.102. The information contained in this Closure Plan will be used to assist Duke Energy in the closure of the 1971 Ash Basin and 1984 Ash Basin (Ash Basins) located in New Hanover County, North Carolina, on property owned by Duke Energy. This Closure Plan was originally posted to the Duke Energy operating record on October 17, 2016. The Closure Plan presented herein is a revision to the original and has been revised to update the closure initiation date and anticipated final closure date presented in Section 5. This Closure Plan may be further amended pursuant to the requirements of 40 C.F.R. § 257.102(b)(3). Presented below are:

1. a narrative of closure activities;
2. a description of the procedures to remove CCR and decontaminate the CCR units;
3. an estimate of the in-place CCR inventory requiring closure;
4. an estimate of the largest area of the CCR units requiring a final cover (as needed);
5. a closure schedule; and
6. a written certification from a qualified professional engineer, licensed in North Carolina, that this Closure Plan meets the requirements of 40 C.F.R. § 257.102.

1 NARRATIVE OF CLOSURE ACTIVITIES

The purpose of this Closure Plan is to describe the steps necessary to close the Ash Basins consistent with recognized and generally accepted good engineering practices. Closure is designed to reduce the need for long-term maintenance and control the post-closure release of constituents into environmental pathways (i.e., air, surface water, and groundwater).

The Ash Basins will be closed through the removal of CCR, and the closure will be performed pursuant to 40 C.F.R. § 257.102(c). CCR will be removed as described in the following section.

2 CCR REMOVAL AND DECONTAMINATION

The procedures to remove CCR from the Ash Basins include dewatering and utilizing appropriate equipment and methods to excavate and move the CCR to permitted off-site and on-site landfills. Dewatering will include removal of bulk water/free liquids and interstitial/pore water (as needed) to allow for safe excavation.

The existing embankments will be breached pursuant to a North Carolina Department of Environmental Quality (NCDEQ) Dam Safety permit approval. This breach is intended to promote free drainage of storm water from the closure area.

Existing appurtenant structures, such as ditches, culverts, and miscellaneous piping, will be decontaminated and abandoned in place, removed and disposed in a permitted disposal facility,

or removed and placed in a beneficial use facility identified at the time of closure. Decontamination procedures may consist of pressure washing, scrubbing, or other generally accepted decontamination procedures.

Pursuant to 40 C.F.R. § 257.102(c), closure will be complete when groundwater monitoring concentrations do not exceed the applicable groundwater protection standard established pursuant to 40 C.F.R. § 257.95(h) for constituents listed in appendix IV to 40 C.F.R. Part 257.

3 ESTIMATE OF IN-PLACE CCR INVENTORY

The volumes of CCR present in the Ash Basins were calculated and are presented in Table 1 below, pursuant to 40 C.F.R. § 257.102(b)(1)(iv). The volumes are the estimated inventory of CCR that will be open (and require closure) at one time, and the estimates are based on bathymetric surveys, historical topography, and soil borings as of March 2015. The estimates do not include any material discharged into or removed from the Ash Basins after March 2015. The annual surface impoundment inspections completed, pursuant to 40 C.F.R. § 257.83(b), and posted to the Duke Energy CCR website, pursuant to 40 C.F.R. § 257.107(g)(5), contain the most recent estimates of CCR material in the Ash Basins.

Table 1. Estimated In-Place CCR Inventory On-Site

Basin	Quantity of CCR (cubic yards)
1971 Ash Basin	3,184,000
1984 Ash Basin	2,362,000
TOTAL	5,546,000

4 ESTIMATE OF MAXIMUM AREA REQUIRING FINAL COVER

CCR will be removed from the Ash Basins pursuant to §257.102(c); therefore, no final cover system will be constructed in support of closure activities.

5 CLOSURE SCHEDULE

The Ash Basins ceased receiving non-CCR waste streams on July 6, 2016 (receipt of CCR waste streams ceased prior to this date). Closure of the Ash Basins initiated on July 6, 2016, within 30 days of final receipt of CCR or non-CCR waste streams pursuant to 40 C.F.R. § 257.102(e). However, limited CCR excavation operations began prior to that date. Closure of the Ash Basins will be extended due to the delayed receipt of the on-site landfill permit to construct but is anticipated to be completed by February 2020 (i.e., still within five years of the commencement of closure pursuant to 40 C.F.R. § 257.102(f)(1)(ii)). Throughout the closure process, Duke Energy will continue to evaluate and take, as appropriate, commercially reasonable measures to expedite environmentally protective closure of the Ash Basins.

Prior to commencing closure construction, design documents will be prepared to support applications for required local, state, and federal permits. Closure construction design documents will include construction drawings for closure, technical specifications, and quality testing work plans. The permits required for closure construction activities will be evaluated at the time of closure and are anticipated to include permits from the NCDEQ and the U.S. Army Corps of Engineers. Preliminary time frames for the anticipated closure activities are included below in Table 2.

Table 2. Estimated Time Frames for Closure Activities

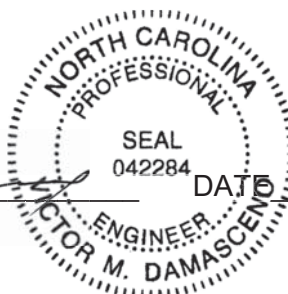
Closure Activity	Time Frame (years)*
NCDEQ Closure Plan Approval	1
NCDEQ Permitting Approvals (NDPES, E&SC, Air)	1
Dewatering and Stabilization	4.5
NCDEQ Landfill Permit Approval	1.5
CCR Excavation	4.5
NCDEQ Dam Decommissioning Approval	0.5

*Estimated closure activity time frames may include some overlap.

6 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Victor M. Damasceno, being a registered Professional Engineer in the state of North Carolina, do hereby certify to the best of my knowledge, information, and belief, that the information contained in this written Closure Plan dated March 7, 2017, was developed pursuant to the requirements of 40 C.F.R. § 257.102 and has been prepared in accordance with recognized and generally accepted good engineering practices.

SIGNATURE

DATE 7 March 2017

Prepared by:



WEATHERSPOON STEAM ELECTRIC PLANT
1979 ASH BASIN

CLOSURE PLAN

OCTOBER 10, 2016

Certified by:



S&ME, Inc.

9751 Southern Pine Boulevard

Charlotte, NC 28273

Project No. 7235-15-028

WSPN_CLOSE_PLN

Rev. 0

Duke Energy Progress, LLC (Duke Energy) prepared this Closure Plan for the Coal Combustion Residuals (CCR) surface impoundment at the Weatherspoon Steam Electric Plant (Weatherspoon) pursuant to the requirements of 40 C.F.R. § 257.102(b) of the Disposal of CCR from Electric Utilities rule, 80 Fed. Reg. 21302 (April 17, 2015). S&ME, Inc. was retained by Duke Energy to certify that this Closure Plan meets the requirements of 40 C.F.R. § 257.102. The information contained in this Closure Plan will be used to assist Duke Energy in the closure of the 1979 Ash Basin (Ash Basin) located in Robeson County, North Carolina, on property owned by Duke Energy. This Closure Plan may be amended pursuant to the requirements of 40 C.F.R. § 257.102(b)(3). Presented below are:

1. A narrative of closure activities;
2. A description of the procedures to remove CCR and decontaminate the CCR unit;
3. An estimate of the in-place CCR inventory requiring closure;
4. An estimate of the largest area of the CCR unit requiring a final cover (as needed);
5. A closure schedule; and
6. A written certification from a qualified professional engineer, licensed in North Carolina, that this Closure Plan meets the requirements of 40 C.F.R. § 257.102.

1 NARRATIVE OF CLOSURE ACTIVITIES

The purpose of this Closure Plan is to describe the steps necessary to close the Ash Basin consistent with recognized and generally accepted good engineering practices. Closure is designed to reduce the need for long-term maintenance and control the post-closure release of constituents into environmental pathways (i.e., air, surface water, and groundwater). This Closure Plan may be amended pursuant to the requirements of 40 C.F.R. § 257.102(b)(3).

The Ash Basin will be closed through the removal of CCR, and the closure will be performed pursuant to 40 C.F.R. § 257.102(c). CCR will be removed as described in the following section.

Duke Energy is assessing the potential to site Weatherspoon for an ash beneficiation project pursuant to North Carolina General Statutes (N.C.G.S.) § 130A-309.216, as enacted by Section 1 of House Bill 630, Session Law 2016-95. If Duke Energy selects Weatherspoon for beneficiation purposes, to the extent that there is any remaining CCR in the Ash Basin after beneficiation operations have permanently ceased, the CCR will be moved to a permitted disposal facility.

2 CCR REMOVAL AND DECONTAMINATION

The procedures to remove CCR from the Ash Basin include dewatering and utilizing appropriate equipment and methods to excavate and move the CCR to a permitted disposal location. Dewatering will include removal of bulk water/free liquids and interstitial/pore water (as needed) to allow for safe excavation. The existing embankments will be removed pursuant to a North Carolina Department of Environmental Quality (NCDEQ) Dam Safety permit approval. This removal is intended to promote free drainage of stormwater from the closure area.

Existing appurtenant structures, such as ditches, culverts, and miscellaneous piping, will be decontaminated and abandoned in place, removed and disposed of in a permitted disposal facility, or removed and placed in a beneficial use facility identified at the time of closure. Decontamination procedures may consist of pressure washing, scrubbing, or other generally accepted decontamination procedures.

Pursuant to 40 C.F.R. § 257.102(c), closure will be complete when groundwater monitoring concentrations do not exceed the applicable groundwater protection standard established pursuant to 40 C.F.R. § 257.95(h) for constituents listed in appendix IV to 40 C.F.R. Part 257.

3 ESTIMATE OF IN-PLACE CCR INVENTORY

The volume of CCR present in the Ash Basin was calculated and is presented in Table 1 below, pursuant to 40 C.F.R. § 257.102(b)(1)(iv). The volume is the estimated inventory of CCR that will be open (and require closure) at one time, and the estimate is based on historical topography and soil borings as of 2015. The annual surface impoundment inspections completed, pursuant to 40 C.F.R. § 257.83(b), and posted to the Duke Energy CCR website, pursuant to 40 C.F.R. § 257.107(g)(5), contain the most recent estimates of CCR material in the Ash Basin.

Table 1. Estimated In-Place CCR Inventory

Basin	Quantity of CCR (cubic yards)
Ash Basin	2,040,000

4 ESTIMATE OF LARGEST AREA REQUIRING FINAL COVER

CCR will be removed from the Ash Basin pursuant to 40 C.F.R. § 257.102(c); therefore, no final cover system will be constructed in support of closure activities.

5 CLOSURE SCHEDULE

Closure of the Ash Basin was initiated in November 2015 and is anticipated to be completed within nine years of the commencement of closure activities. The closure time frame includes two two-year time extensions beyond the time specified in 40 C.F.R. § 257.102(f)(1)(ii) on the basis that the anticipated time required to close the Ash Basin will need to be lengthened due to

- The Ash Basin being larger than 40 acres (estimated 58 acres); and
- The time required to develop a lined CCR placement solution in accordance with state and federal law.

The completed demonstration establishing why it is not feasible to complete closure of the Ash Basin within the five-year time frame due to factors beyond the facility's control will be prepared and placed in the facility's operating record prior to the end of any two-year period pursuant to 40 C.F.R. § 257.102(f)(2).

Prior to commencing closure construction, design documents will be prepared to support applications for required local, state, and federal permits. Closure construction design documents will include construction drawings, technical specifications, and quality assurance testing work plans. The permits required for closure construction activities will be evaluated at the time of closure and are anticipated to include permits from NCDEQ and the U.S. Army Corps of Engineers. Preliminary time frames of anticipated closure activities for the Ash Basin are included below in Table 2. Duke Energy estimates that all of the closure activities for the Ash Basin will be completed by 2024. However, Duke Energy is assessing the potential to site an ash beneficiation project at Weatherspoon pursuant to N.C.G.S. § 130A-309.216. If deemed feasible, commencement of closure would not be initiated until the known final volume of CCR is removed from the CCR unit for the purpose of beneficial use pursuant to 40 C.F.R. § 257.102(e)(1)(ii). In such case, all of the closure activities for the Ash Basin will be completed by 2029. In the event Weatherspoon is selected as a beneficiation site, Duke Energy will amend this Closure Plan pursuant to the requirements of 40 C.F.R. § 257.102(b)(3).

Table 2. Estimated Time Frames for Closure Activities

Closure Activity	Time Frame (year)*
NCDEQ Closure Plan Approval	1
NCDEQ Permitting Approvals (NDPES, E&SC, Air)	1
Dewatering and Stabilization	2
CCR Excavation	3
NCDEQ Dam Decommissioning Approval	0.5

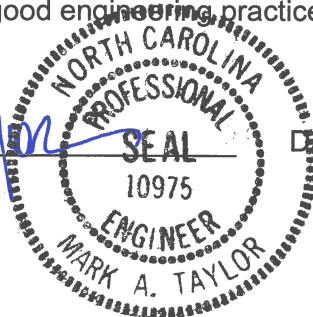
*Estimated closure activity time frames may include some overlap.

6 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Mark Anderson Taylor, being a registered Professional Engineer in the state of North Carolina, do hereby certify to the best of my knowledge, information, and belief, that the information contained in this written Closure Plan dated October 10, 2016, was developed pursuant to the requirements of 40 C.F.R. § 257.102 and has been prepared in accordance with recognized and generally accepted good engineering practices.

SIGNATURE

Mark Anderson Taylor



DATE

10/10/2016